



Blackburn Law

January 20, 2021

VIA EMAIL

Ms. Crystal Henwood
Regulatory Affairs Officer/Clerk
Nova Scotia Utility and Review Board
1601 Lower Water Street, 3rd Floor
Halifax NS B3J 3S3

Dear Ms. Henwood:

Re: M08929 - NS Power's Integrated Resource Plan (ISP)(P-884)

The Small Business Advocate (SBA) participated in the public stakeholder engagement sessions held by NS Power Inc (NSPI) as well as engaged in focused discussions with NSPI on various issues. The SBA acknowledges the significant level of engagement and collaboration undertaken within this process. The comments and observations by the various stakeholders appeared to be heard and incorporated into subsequent documentation and drafts by NSPI, which is appreciated.

The IRP Final Report filed by NSPI is comprehensive and well laid out. The SBA has provided comments to NSPI throughout the various stages of the stakeholder involvement process, some of which are repeated below. All of the SBA's prior comments still apply, even if not referenced specifically below.

I. Resource Acquisition Regulatory Process

A. Resource commitment and expenditure approval

It must be noted at the outset that, even with the SBA's and its consultants, Daymark Energy Advisors, extensive participation in the stakeholder engagement events, the SBA is not supporting any specific approval of resource investments or expenditures. Each proposed resource project expenditures must be properly researched and analyzed, with detailed project information provided; evaluated for proper considerations of risk; approved by the Board in an adjudicated Matter; and prudently managed by NSPI.

NSPI is preparing to embark on an integrated plan of activities, from funding DSM to adding new regional transmission interconnections, as well as capacity additions and refurbishments of

existing hydroelectric and fossil fueled generating capacity. This will require billions of dollars of capital investment, with the primary objective to support the decarbonization policies of the federal and Nova Scotia provincial government. The Board, ratepayer representatives and other stakeholders must be afforded the opportunity to participate in formal regulatory project approvals. The SBA will a committed participant in the Board's ongoing discussions and review of NSPI project cost contingencies.

B. Potential for competitive procurement

As with almost all electric utility IRP processes, the NSPI IRP did not study the option of any of the proposed new resources being developed, operated, and owned by an entity other than NSPI. As such, the IRP utilizes the presumption that the resources will have costs similar to NSPI owning, financing, and operating each of them. However, third party resource developers can have a much different project cost structure, from tax policies, standard accounting rules, and access to capital, which vary significantly from how NSPI operates. As a result, ratepayers may benefit from a different ownership arrangement, depending on how the risks associated with a resource's final costs develop as compared to the project planning estimates/budgets. The use of non-utility ownership and financing could possibly unburden NSPI if the capital expenditures required to develop the resource prove extensive.

NSPI should consider the option of competitive solicitations for any resource investment that is part of the integrated resource plan. This includes renewable and new natural gas fueled generating capacity, transmission lines, negotiated purchase power agreements, etc. Competitive procurements can be resource specific or with all-source bidding.

It would be beneficial for the option to be investigated prior to looking at any one specific resource, to identify any potential legislative or policy issues. The SBA recommends that NSPI prepare a report on the resource procurement and ownership alternatives to be considered and what the trade-offs are between the options. This report should be open for Board review and stakeholder comment.

C. Customer owned resources

NSPI has incorporated the potential for distributed and customer owned generation into the IRP analyses, which shows higher average costs per kWh than other strategies. Despite that, the SBA believes it is important for NSPI to incorporate the forecast for the potential for customer behind the meter generation as part of its planning exercise so as not to overbuild its system and having higher than necessary revenue requirements. It must be remembered that customer behind the meter generation is based upon retail customer economics and not the result of utility IRP economics.

II. IRP Process Comments

A. Stakeholder involvement

The SBA has participated extensively in the stakeholder input process implemented by NSPI and its consultants. The presentation of the pre-IRP studies and the step-by-step process of the IRP, from assumptions through scenario analyses to the development of the action plan, has shown NSPI's commitment to a true dialogue. The SBA has provided NSPI with written comments on materials and discussions at all the technical meetings. NSPI and its consultants have been available for informal dialogue, questions, and suggestions. Several of the points discussed have been incorporated into the IRP analysis. The SBA's consultants have pointed out that the stakeholder process as executed proved to be a process that adds value to the final IRP product.

B. Detailed Board review

The SBA comments are being provided as part of an informal Board review process and not a full Board paper hearing. It is important for NSPI to keep in mind that general approval of the IRP by the Board is not approval for project capital expenditures to commence. The SBA notes that a scenario-based optimization model IRP approach, even with the sensitivity cases modeling by NSPI, is not a substitute for specific resource economic evaluations, which require a formal Board application and stakeholder intervention process. The SBA believes it is important for all stakeholders to have a clear understanding of the path of regulatory approvals required for any IRP related expenditures that NSPI intends to make prior to presenting applications before the Board for review.

III. Evergreen IRP Process

The IRP provides a detailed review of NSPI's extensive planning efforts conducted over the last 18 months. The multiple analyses, along with the detailed assumptions developed by NSPI as inputs into the analyses, have demonstrated to stakeholders the increasing complexity of the utility investment environment, as well as the sensitivity of optimal resource decisions to the analytical inputs. This indicates that as system conditions evolve and resource costs change over time, there will be a need to continually update assumptions and refresh analysis when needed.

NSPI acknowledges this need by discussing an "evergreen IRP process" to continuously monitor and update investment plans as conditions change. NSPI indicates that one element of this evergreen IRP process will be regular updates as part of the IRP Action Plan reporting. The SBA recommends that NPSI clarify what types of information will be reported in those updates, such as changes to resource cost or operational assumptions, electrification or load changes, and import/export market changes. It should also be made clear what the proposal is for stakeholder involvement in the evergreen IRP process.

The IRP identifies several "signposts" that NSPI will monitor as the IRP is implemented. Signposts are very important to resource planning, particularly when there is no set schedule for filing a new comprehensive IRP. The signposts that are identified in the IRP are vague, and most include "monitoring" certain conditions. The document currently does not lay out a procedure for how information gathered from this monitoring would trigger a change in resource plan or a proceeding before the Board. NSPI should elaborate on the use of signposts and provide more detailed procedures.

This evergreen process could be the forum for NSPI to present the financial, rather than just economic, implications of the IRP resource development. The total investment of generation and transmission assets in the IRP is likely to be ten billion dollars or more. The IRP has not addressed the ability for NSPI to finance such investment levels without a degradation in credit rating. This is important since any increase in borrowing costs would be passed on to ratepayers, increasing the costs of the resource plan.

IV. IRP Recommended NSPI Resource Prioritization

A. NSPI Favoured resources

In the IRP NSPI has set out a prioritization of resource development activities. The SBA notes that the focus and action items appear to be on the continued utilization of existing generation assets; the retirement of the coal generation fleet; and the establishment of enhanced regional integration through new transmission lines and contractual imports of energy and capacity.

The IRP also concludes that incremental renewables will be a significant component of future resource additions, which brings new planning challenges. The IRP process addressed the initial evaluation of system inertia-based generation needs given the potential increased reliance of the NSPI system on inverter-based technologies such as wind, solar and battery storage. In addition, the IRP identifies regional integration as a critical component of the plan to add incremental renewable resources. As we will discuss below, if there is one lesson learned from the Maritime Link and Muskrat Falls Generation Station project, the ability to develop an additional interconnection to another province and have that interconnection deliver significant clean energy and capacity to Nova Scotia is far from certain, especially in terms of timing and cost.

B. Reliance on Natural Gas

Stepping back and looking at the big picture, the SBA notes that it is surprising how much the IRP includes investment in natural gas burning assets. The SBA acknowledges that any movement from coal fueled generation to natural gas fueled generation reduces the creation of GHG, but natural gas-based generation may not have a future role in the objective to establish a decarbonized economy in Nova Scotia. The SBA is concerned that much of the investment in natural gas assets could result in essentially a stranded investment if these assets end up with low or no utilization, creating an early economic obsolescence in the following areas:

Conversions of coal units to natural gas - The IRP notes that coal-to-gas conversions are selected economically in most of the key scenarios. However, NSPI notes, and the SBA agrees, that the analysis is reliant on a multitude of input assumptions. NSPI should develop a framework to review the economics of these conversions to ensure that the additional investment in GHG-emitting resources does not quickly become a stranded cost if non-emitting alternatives (firm imports, storage, etc.) become more economical in the near future. Is there a “breakeven” point where NSPI would pursue non-emitting options instead? How will NSPI balance the priority of investing in low-carbon options with the economics of the conversions, and what analysis will support the decision-making?

Existing peaking generation – The IRP notes the refurbishment of existing diesel and other peaking capacity has been shown to be cost-effective within the supply ‘screening’ analysis. As such, the IRP includes a scenario that involves commencing activity to invest in existing peaking capacity. The SBA has concerns that NSPI may be considering the economics of such projects to be thoroughly established and not require additional project approval. The SBA would like to see a specific replacement versus refurbishment analysis, including the consideration of energy storage, demand response, or peak demand reduction measures as alternatives to natural gas peaking capacity investments.

New capacity – The IRP scenario modeling results show that natural gas-fired aeroderivative combustion turbines and combined cycles are required to maintain resource adequacy and responsiveness. The SBA strongly recommends that NSPI delay such investments as much as possible to allow non-carbon emitting resource technology development, including reducing demand through innovative rate designs and energy storage, in order to potentially avoid investment in natural gas-based generation that could face early obsolescence or underutilization in the future.

C. Renewable Resource Development

In the IRP NSPI assumes onshore wind is the primary renewable resource as part of the future portfolio. Other areas on the Atlantic coast of North America are focusing on offshore wind to provide resource diversity. This raises the question of whether NSPI’s analysis fully incorporated the benefits of diversity of timing of production (e.g., through the ELCC analysis). Also, if the costs of offshore wind come down considerably over the study period, are there planning decisions (such as transmission investments or conventional capacity additions) included in this IRP that would be rendered unnecessary? NSPI should provide sensitivity modeling that would help understand this issue, and should specifically track the cost of offshore wind procurements conducted in the northeast U.S. as part of the evergreen IRP process.

Nova Scotia Power Stability Study for Renewable Integration Report -The renewable integration study conducted by PSC North America and provided with the pre-IRP materials is an important study that provides information essential to the long-term strategic planning process. As load profiles change and grid supply becomes more reliant on renewables, it is critical to address reliability and system strength concerns. The renewable integration study provides new information about the capability of the system to integrate additional renewables. To provide additional value to the planning process, the SBA believes the study should be expanded. It is our understanding that the study showed system integrity issues under some scenarios, even at the current 600 MW level of renewable energy inverter-based generation. This needs to be examined closely as enabling investment may be necessary in the near term, much earlier than a new interconnection could be planned, approved, constructed, and energized.

D. Absence of Energy Storage in the Plan

Energy storage is perhaps the one resource, across the whole electric utility industry, which is at its most dynamic point of technological development. Advances in battery energy storage are fundamental to the electrification of transportation. As such, it is somewhat surprising to see the

insignificant role energy storage has in the NSPI IRP in the long-term. This does not signal a flaw in the IRP but likely demonstrates a lack of foresight and an analytical process that may have favoured the consideration and evaluation of traditional utility generation and transmission options.

The IRP does not appear to have evaluated where battery energy storage costs may be heading. There also does not appear to be any action items relating to monitoring and learning from utility applications of large battery storage projects across North America to determine how these projects successfully satisfy needs for peaking capacity without any danger to system integrity.

E. DSM Not Fully Integrated

Energy efficiency scenarios – One of the outcomes of the IRP is supposed to be avoided cost levels that will be passed on to EOne in order to develop energy efficiency (EE) strategies. It is unclear how this approach will be implemented. For example, will NSPI procure all EE measures that are cost-effective given a certain avoided cost scenario? What criteria, in terms of contribution to decarbonizing Nova Scotia, should be included in the EOne analysis? Will EOne be given guidance on how to use the avoided cost values to structure EE programs? How will the parties consider the dynamic nature of the impact of EE savings on avoided cost levels? How will the electrification progress be incorporated into the analytical steps on an ongoing basis? Has the IRP, as a long-term planning exercise, attempted to capture any transmission and distribution (“T&D”) system cost savings in scenarios with higher levels of system load impact?

NSPI still appears to have a detached or awkwardness in its approach to DSM integration into its planning. The cooperation in terms of utilizing EOne data and assumptions for DSM potential impact and costs has made a great leap forward in this IRP. However, the SBA believes that there is a long way to go. No other resources studied within the IRP have an implementation plan or action items that are limited to simply providing avoided costs to another organization. The IRP is the vehicle for NSPI to establish how it can find the optimum utilization of DSM within its integrated plan and set up the process by which to procure that recommended amount of DSM through EOne. This IRP has not done that. This suggests to SBA that DSM has not been integrated into the resource planning process as expected. DSM is a critical tool for providing grid flexibility and controlling costs in a decarbonizing grid, and SBA believes NSPI should work to improve the integration of DSM into the planning process.

DSM rate impacts – The IRP examines the fact that in higher DSM scenarios, thus lower consumption / lower NSPI sales, there is an uptick in average unit costs per kWh for the NSPI system. The IRP does not establish a NSPI position on what amount of increase in ‘rates’ that would go along with the increase in unit costs that would be considered tolerable. In fact, the impact on average costs for DSM investments appears to be the only place where affordability is even indirectly discussed. Affordability is a customer bill impact as well as a rate impact. Affordability has a timing nature not just a lifecycle analysis. The Board has required EOne to perform rate and bill impact analysis (“RBIA”) of its past and planned expenditures. The IRP makes no attempt to recognize or compare that the IRP findings and the RBIA.

F. Lack of Distributed Generation Integration

Distributed generation (“DG”) is also not fully integrated into the IRP evaluation and considerations. The SBA acknowledges that there is a difficulty in having the IRP fully evaluate the merits on a total resource cost basis of customer investment in behind the meter generation when the metrics all focus on how the resources affect utility costs. This is true with DSM as well as DG. The DG case results also are characterized by higher NSPI average unit costs. It is important to recognize that rate design has not been addressed in the IRP analysis. The IRP has not estimated the reduction in future NSPI revenue due to customers installing behind the meter generation and thus reducing purchases from NSPI. The use of net energy metering or billing has not been assumed or included in the IRP.

The benefits of reductions in T&D investment from the load reductions that will occur with significant DG penetration have not been incorporated into the IRP analyses either. Nor has a value been placed on increased system resiliency. The SBA would like NSPI to set up an action item to begin more detailed evaluation of these benefits. This is especially critical if widespread electrification creates significant load growth for the NSPI system.

NSPI must, at minimum, begin to increase their ability to forecast the penetrations of DG, recognizing it is a retail customer decision, based upon retail rate tariffs, customer preferences and technology costs. This is not a utility resource decision. A failure to forecast DG penetration accurately could result in either a system overbuild or a need to rely upon quick implementation and higher cost resource choices by NSPI.

The SBA notes that NSPI actions flowing from the IRP include collecting data and monitoring for T&D impacts of electrification-driven loads. The SBA submits that this is much too reactive. NSPI has the capability to model the changing load shape and level associated with electrification at the T&D level if it is so inclined. Waiting for costs to occur means not having that information to help policy makers fully comprehend the impact of electrification when the decisions are put in motion. Forecasting the impacts of electrification allows for improved T&D system planning and more optimum and least cost investments in the system.

V. Electrification

A. Limitation on Conclusions that can be Drawn from the IRP Analysis

The SBA has been supportive throughout the IRP process for a focus on recognizing that a resource plan must reflect the province’s policies regarding decarbonization. Contributing to decarbonization on the supply side and being able to continue to decarbonize its supply with significant increases in electric demand due to electrification, primarily in the heating and transportation sectors, is a new requirement in resource planning which ranks equally as important as maintaining reliability through meeting resource adequacy requirements. The SBA agrees that this IRP process has recognized this requirement.

The IRP has included, as recommended by the SBA over the years, a rate impact metric and not just a long-term revenue requirement impact metric to make decisions among resource strategies. We will discuss metrics more fully later in these comments. The IRP findings conclude that

electrification is beneficial rather than a burden to NSPI ratepayers in those scenarios with higher loads due to electrification resulting in a lower average unit cost per kWh.

The SBA issues a large caution here. It is a great result to see that higher electrification-driven higher utility loads can be supplied reliably and still have reductions in carbon emissions of the electric sector in Nova Scotia. The impact on costs is likely more uncertain. The caution the SBA offers is that there is large timing uncertainty around the actual electrification-related consumption changes, whether that be heat pumps, electric vehicles or other. The SBA also questions whether all the system costs to serve the higher loads have been identified. What investments will be required on the transmission and distribution systems to accommodate the higher loads? This has been assumed to be zero in the IRP analysis. Also, the SBA cautions that it is unclear as to how the lower average unit costs will impact rates. The IRP did not study any need for rate design changes to accommodate or encourage electrification. The IRP did not look at marginal tariff revenue but rather discusses rate impacts as if all the increased electric sales will be charged the average cost of electricity. The IRP has not evaluated any changes that would result in cost allocation among the rate classes to know what potential impacts lie ahead.

The potential for upward pressure on system load levels from electrification coupled with significant potential for reductions in system loads with increased energy efficiency create interesting opportunities at the T&D system planning level. This may be the right time for NSPI to revisit and re-engineer its T&D system planning. The scope should be expanded to include more price forecasting, more consideration of wires and non-wires alternatives such as efficiency, demand response and DG. While this was not expected during an IRP, the SBA offers that it should be part of the action plan in order to supplement the initiatives that more directly result from the IRP.

The SBA does not raise these cautions to say that electrification is bad. The issues raised by these cautions are essential to understand before NSPI takes the role of promoter, champion, and funder (albeit through ratepayer bills) of electrification.

B. Role of NSPI in Electrification

It is unclear from the IRP Report what role NSPI intends to take with respect to electrification. It is essential for there to be active tracking of how the province may be changing in terms of electrification, which is something that NSPI is ideally positioned to monitor. However, there is a question of whether it is appropriate for NSPI to spend significant sums to encourage electrification. It appears that there could be substantial savings as electrification occurs, but those savings should not be offset up by potentially unnecessary expenses. There remains the issue of natural electrification, where people organically and without prompting move to electric cars and electric heat. Spending upwards of \$10 million annually to speed up electrification, assuming it is successful, could very well be money spent on people who would already have made the change, essentially akin to the free rider issues within DSM evaluations. This is crucial for electrification, as it will generally require expensive changes, such as switching to an electric vehicle or changing how one heats their house.

The SBA believes there needs to be a discussion on what the role of NSPI is in incentivizing, rather than simply tracking, electrification. If there is merit to incentivizing electrification, either by NSPI or a third party, there needs to be analysis of what the value is for that electrification to all ratepayers so that non-participating ratepayers do not carry the burden for those who benefit from incentives. The SBA's initial belief is that the role is better suited to be given to EOne to be integrated into its energy efficiency planning as EOne has the established organization for program delivery. Since NSPI ultimately procures the EOne services, there needs to be a discussion of what would be involved, including the funding and managing of the programs as two distinct choices.

NSPI has a clear role in maintaining a clean, reliable, and robust electric system. Additional roles funded by ratepayers would need to be considered and decided upon by stakeholders, the Board and potentially the provincial government.

As noted earlier the SBA notes that NSPI actions flowing from the IRP include collecting data and monitoring for T&D impacts of electrification-driven loads. The SBA submits that this is much too reactive. NSPI has the capability to model the changing load shape and level associated with electrification at the T&D level if it is so inclined. Waiting for costs to occur means not having that information to help policy makers fully comprehend the impact of electrification when the decisions are put in motion. Forecasting the impacts of electrification allows for improved T&D system planning and more optimum and least cost investments in the system.

VI. Regional Integration Strategy

Most IRP scenarios include the selection of the Reliability Tie and Regional Integration as part of the optimal portfolio. Implementing this strategy will require significant coordination with New Brunswick and the availability of supply. Given the primary role of the transmission solutions in NSPI's plan for a reliable and economic supply portfolio, NSPI should prepare a specific timeline and plan for the steps required in Action Plan Item #1 to ensure that this is a feasible solution to deliver the benefits assumed in the IRP.

A. Comments on Analysis

The Findings, Roadmap, and Action Plan in the IRP report conclude that the Reliability Tie and Regional Integration strategy is a common component of top-performing plans and should be immediately pursued. The IRP seeks to implement these options more quickly than indicated by the IRP models, if accelerating the timing is determined to be feasible.

This strategy appears economically beneficial given the analysis conducted to date, and the SBA supports further investigation. However, not all aspects of this strategy have been fully vetted and there is additional analysis that must be conducted to determine if this is technically feasible and economically beneficial. This includes the determination of the availability of firm capacity from other regions, which may be challenging as all regions in eastern Canada and the northeastern United States are actively seeking clean, dispatchable capacity to support decarbonization efforts. In addition, the technical analysis conducted by PSC on the inertia needs of the system provided

an important initial assessment, but will need to be supplemented by additional study prior to relying on firm imports for reliability. These issues need to be addressed in advance of any significant investment commitment, and the additional work needed prior to pursuing the option should be explicitly acknowledged.

The modeling of the inertia requirement has supported certain resource decisions, in particular the addition of the Reliability Tie, which is assumed to provide all the system inertia needed by the NSPI system. However, this conclusion requires some further investigation. Additionally, NSPI has previously noted that it has not evaluated the possibility that wind projects could provide fast frequency response, which is a method of addressing system inertia concerns used in other regions.

B. Coordination with New Brunswick

The prospect of Regional Integration is enticing, as it suggests the ability to efficiently manage our electricity needs, with a strong backup from New Brunswick and beyond. However, the term ‘integration’ suggests a cooperative arrangement. There did not appear to be any review of potential downsides to the arrangement, nor the potential impact to the IRP should New Brunswick not wish to participate in such a proposal. At the onset of the IRP, perhaps during the pre-IRP stakeholder sessions, it was acknowledged that initial discussions with New Brunswick were not met with enthusiasm in that province. While it is important for there to be collaboration between the provinces with respect to electricity, Nova Scotia needs to ensure that the interests of its ratepayers are always met, which could be challenging in an integrated system with conflicting demands. The reliance on regional integration for the various models requires additional consideration for something that is not fully within the control of NSPI.

C. Concern about Risks

The Reliability Tie and Regional interconnection are significant components of the initial modeling results and would represent substantial investments. Given the scope of the investment it is important to understand the risks associated with the investment, and the cost of alternatives. Some questions to consider include:

- What will the costs be?
- How much commitment is required from the generation facilities and counterparties supplying the energy and capacity through New Brunswick before the transmission investments are made?
- What additional studies will be required if the reliability tie or regional integration plan is selected? What would be the schedule for those studies?

For each portfolio that selects a transmission upgrade as part of a least-cost plan, NSPI should provide results demonstrating the incremental cost of the non-transmission option so the Board can balance the cost against the risk if the transmission investment is not fully utilized or if a lower cost option becomes available. This should be clearly considered within the decision process to choose a preferred portfolio.

The SBA would like to see NSPI work parallel paths to meeting its IRP objectives with or without the regional integration strategy until such time as it is clear which is the better path.

VII. IRP Analysis and Metrics

A. NSPI/E3 Modeling

The SBA believes the Planning Reserve Margin (“PRM”) study should include expanded analysis on interties. The initial PRM study included conservative assumptions related to tie benefits from interconnections with New Brunswick and the Maritime Link. In the example of New Brunswick, E3 assumed no tie benefit, assuming that New Brunswick is likely to experience resource shortages coincident with Nova Scotia. This assumption should be based on study and analysis of historical shortages, as well as reasonable forecasts of system changes in the future. By relying on conservative assumptions, NSPI may be failing to recognize the reliability value the interconnection can provide and therefore over-planning for capacity need. A more detailed study of the potential tie benefits of the interconnection would allow for a more comprehensive assessment of the costs and reliability risks of future resource decisions.

The SBA has, in prior comments, suggested that NSPI should conduct additional analysis to identify the minimum amount of inertia requirements in the province under different system conditions. The 3266 MW.sec requirement was based on specific load conditions resulting in a 2766 MW.sec requirement, plus a 500 MW.sec generic additional requirement. Additional analysis would allow for more dynamic modeling of this requirement and provide additional insight on the inertial need over time as load, DSM, and supply-side portfolio mix changes. Since ascribing this benefit of providing all the inertia requirements is uncertain and very valuable to the evaluation, the SBA was encouraged to see the sensitivity analysis performed to check to see that the inertia benefits remain.

B. Metrics – NPV Partial Revenue Requirements, Rate Impacts

The primary metric of partial revenue requirement minimization over a long horizon was calculated PVRR utilizing a real levelized capital cost recovery factor in modeling. The SBA would like to see the corresponding values utilizing nominal accounting cost recovery or revenue requirements. Perhaps this information could be part of the initial evergreen update of the IRP.

The SBA was encouraged to see some progress made on the IRP process, including the first step on providing insight on affordability of each portfolio by utilizing the annual average unit cost per kWh of electricity, thereby hopefully utilizing nominal capital cost carrying charges. It is unclear if this used nominal versus levelized carrying charges. NSPI recognizes as was discussed earlier that this is not an exact rate impact metric.

Generally, the more capital a company commits to invest in a portfolio the greater the risk. NSPI should provide a metric calculating total average capital investment requirements over the first five years, ten years, and twenty years. As discussed earlier, financial viability is important to understand costs, benefits, and risks.

The SBA would also like to have some visibility on how much NSPI will be relying upon imported power as a metric, such as average annual imports over the first five years, ten years, and twenty years.

C. Absence of T&D Impact

As discussed earlier, forecasting the impacts of DG, DSM, and electrification-driven loads allows for improved T&D system planning and more optimum and least cost investments in the system. NSPI should develop additional analyses and metrics as part of the evergreen IRP to assess the impact of resource decisions on T&D investment planning.

VIII. Specific Comments on Selected Key Findings

The SBA has extracted the text of several key findings and offers comment on those below. The absence of comments on any findings should not be taken as the SBA agreeing with the findings not discussed.

1b. Increased electricity sales due to electrification can help to reduce upward pressure on electricity rates while facilitating carbon reductions in other sectors. The IRP rate analysis demonstrates the importance of managing the relative growth of peak and energy requirements, highlighting the need to pursue beneficial electrification.

This finding is based on the results of the relative rate impact analysis which was conducted using the Final Portfolio Study results. This analysis showed that higher fixed system costs associated with increased levels of electrification are being distributed over a larger number of sales units, reducing the average unit cost. The impact of the relative growth of peak and energy requirements is most clearly observed when evaluating the Distributed Resources (B) scenarios, where energy requirements are reduced significantly while peak requirements are unchanged; this extreme case is shown to have a higher relative rate impact than other scenarios.

This is an extremely high-level analysis. Actual rate design will determine impact on rates. There is a difference in average unit costs per kWh decreasing and knowing whether the rates that customers pay will be lower or higher. Promotional rates that comport with provincial policy to stimulate the customer electrification decisions that affect decarbonization of the Province could be lower than average and thus may result in additional electric consumption that does not change what a ratepayer pays. Cost allocation among customer rate classes could swing greatly as well.

2a. Regional Integration (i.e., investment in stronger interconnections to other jurisdictions) is an economic component of the lowest-cost plans under each load scenario. Both the Reliability Tie, which strengthens the connection to the North American electrical grid, and a Regional Interconnection, which enables access to firm capacity and energy imports, are shown to have value.

This finding draws on the breadth of the IRP analysis plan and modeling results. When compared on a level basis (holding load, DSM, and emissions constraints

constant and including the low-cost estimate of the DER resources, when present), the Regional Integration (C) scenarios are demonstrated to have a lower NPVRR than equivalent Current Landscape (A) or Distributed Resources (B) scenarios for all seven comparisons modeled.

Distributed Resources (B) scenarios are shown to have higher cost NPV values than Regional Integration (C) scenarios once a low-range estimate of DER cost is incorporated into the results; these scenarios are also shown to have a significantly higher relative rate impact and as a result are not selected for incorporation into the IRP Action Plan.

As discussed earlier, the SBA has concerns that the assumptions and risks associated with this strategy make its outcome more uncertain than is indicated by the IRP analysis. The individual economic analysis has not been done and presented to the Board. The SBA would like to see NSPI provide a detailed project and regulatory plan with timing and expectations for regulatory approvals to allow NSPI to proceed to the next decision point. Any project justification should include a market assessment of resources in New Brunswick and beyond that can provide the energy and capacity modeled within the IRP.

2c. Coal units are generally sustained economically until their model-imposed retirement date, with capacity factors falling in line with declining emissions caps. Many resource plans incorporate economic retirement of one coal unit in the near term, as early as 2023, and some plans see economic retirement of a second coal-fired unit in 2030. New firm capacity is required to offset retiring coal units, to lower carbon emission intensity, and to meet growing electricity demand in all scenarios.

It is shown that across the 13 key scenarios modeled, six incorporate a coal unit retirement in 2023. These retirements are tied to replacement capacity availability, generally via Regional Integration but occasionally enabled by new combustion turbine capacity (e.g., 2.1A). Of the nine key scenarios where coal units must retire by 2040, three retire a second coal unit in 2030 (and a fourth scenario retires two units by 2031)

The SBA would like to see NSPI prepare a plan outlining the economic analysis it intends to use to drive coal retirement proposals as well as the types and timing of regulatory applications to seek approval for retirements.

2d. Nova Scotia Power's existing domestic Hydro resources provide economic benefit to customers and are economically sustained through the planning horizon with the modeled level of sustaining capital investment. Economic justification as part of a capital application will be required to confirm decision to pursue Mersey hydro redevelopment, following the completion of the IRP.

The SBA would like to see NSPI prepare a plan outlining the least cost strategy to meet its obligation for maintaining the hydro assets and avoiding site restoration prior to the construction of the dam and the hydroelectric facility. This should optimize the expenditure

at the correct economic level given the value of the non-emitting generation. The SBA suggests that the Mersey facility be the first to have this approach applied.

2e. DSM energy efficiency programs and costs in the range of the “Base” profile, per the EfficiencyOne 2019 Potential Study, are shown to be most economic relative to other options evaluated under the primary IRP metric of 25-year NPV of Revenue Requirement (with end effects). A focus on peak demand mitigation is indicated and could be optimized into future DSM planning. Other levels of DSM in resource plan sensitivities show higher NPVRR with end effects, as well as mixed effects on other metrics, when compared to Base DSM; Low DSM levels are shown to reduce relative rate impact, while Mid DSM levels are shown to reduce new capacity requirements and GHG emissions, both at a higher NPVRR. Due to the discrete nature of the DSM profiles modeled in the IRP, future DSM program development should incorporate the learnings obtained from the full range of sensitivities and metrics considered in the IRP.

The SBA provides comments above about the need for NSPI to increase the degree of integration of the DSM resource into its planning. Please see the prior DSM discussion.

3b. Nova Scotia Power’s existing combustion turbine resources provide economic benefit to customers and are economically sustained through the planning horizon with the modeled levels of sustaining capital investment. Nova Scotia Power’s existing combustion turbines were analyzed during the Resource Screening phase of the IRP. This analysis showed that the retention of all seven existing diesel units was economic by a significant margin under a range of scenarios and sensitivities, indicating that these units continue to be a valuable source of both firm capacity and ancillary grid services.

The SBA, while not finding a concern regarding the IRP screening analysis, does not consider the IRP screening level analysis sufficient economic justification to proceed. As discussed earlier, a more complete application should be made to the Board, and open for review by consumer representatives and stakeholders in order for NSPI to obtain permission to proceed.

2c. Battery storage can enable wind integration while providing firm capacity and energy storage; however, its ability to substitute for firm capacity resources is limited by its relatively short duration. Up to 120 MW of storage by 2045 is selected in the portfolios with deployments of 30-60 MW by 2025 in many plans.

Battery storage was an integration method for wind capacity beyond 100 MW incremental which was identified during the pre-IRP PSC study and modeled paired with high-inertia synchronous condensers. The ELCC of battery storage was modeled specifically on the Nova Scotia system for several storage durations as part of the E3 Capacity Study, also completed during the pre-IRP phase. In the IRP modeling results, there is a moderate amount of battery storage added across the key scenarios with the ranges above being representative of all scenarios modeled.)

The SBA found that battery storage was only narrowly considered within the IRP and that it will likely have a much larger role in maintaining reliability and facilitating the use of renewable resources than is represented in this IRP.

IX. Specific Comments on Action Plan

The IRP Action Plan describes the key tasks to be undertaken in the next five years to implement the long-term electricity strategy. The IRP maintains that these action plan items are built on the items identified as Key Findings, and further informed by the modeling results and observations. The Action Plan and the SBA's comments with respect to specific steps are set out below.

1. Develop a Regional Integration Strategy to provide access to firm capacity and low-carbon energy while increasing the reliability of Nova Scotia's interconnection with North America. This Strategy will include:

1a. Identifying opportunities for near-term firm imports over existing transmission infrastructure.

1b. Immediately commencing the development of a Reliability Tie and Regional Interconnection via an appropriate regulatory process with target in-service dates as follows:

- *Reliability Tie: 2025-2029 (or earlier if practical and feasible)*
- *Regional Interconnection: 2027-2035*

1c. In parallel with Regional Interconnection development, and working with neighbouring jurisdictions, conducting detailed engineering and economic studies for firm import options requiring new transmission investment and strengthened regional interconnections, including evaluations of availability and security of supply, emissions intensity, and dispatch flexibility. This work will proceed in parallel with the wind procurement strategy (Action Item 3d, below) and will include supporting transmission planning studies.

The SBA finds the action item surrounding the regional integration strategy to be focusing on activities as if approval has been granted. This is a very planning intensive resource option which could reasonably consume millions of dollars in the project conceptualization and preliminary analysis stages. The SBA notes that the regulatory process has not yet been undertaken with respect to this action item and that this should occur prior to any significant monetary expenditure. The SBA suggests that the discussions with neighbouring jurisdictions and a market assessment of import resources should be conducted prior to this regulatory application being undertaken. There is reason to question the presumption that there will be sufficient available energy and capacity necessary to make the investment viable.

2. Electrification is a key variable in this IRP and results indicate that under economic resource plans it can support provincial decarbonization while reducing upward pressure on electricity rates for customers. NS Power proposes several Action Plan items from this IRP related to electrification:

2a. Initiate an Electrification Strategy to develop options for encouraging beneficial electrification with the goals of maintaining rate stability while decarbonizing the Nova Scotia economy consistent with the Sustainable Development Goals Act. The Electrification Strategy will:

- *Incorporate industry best practices such as those identified by the Regulatory Assistance Project as well as other relevant work, for example, electrification programs in other jurisdictions and the details already contained in the Deep Decarbonization Pathways report.*
- *Develop and propose pilots and/or programs that focus initially on transportation and building electrification as identified in the Deep Decarbonization Pathways report as key sectors for early electrification adoption. These pilots and programs will be subject to UARB oversight.*

2b. Initiate a program to collect detailed data, including data on the quantity, flexibility, and hourly load shape of incremental electrification demand, to assist with further system planning work.

2c. Address electrification impacts on the Transmission & Distribution system as additional experience and data become available. This will include an analysis of available and projected T&D capacity at varying levels of electrification as well as identification of potential mitigation options and cost estimates. This analysis will leverage data from Nova Scotia Power's AMI implementation as it becomes available.

The SBA recommends that NSPI propose a clear role for NSPI with respect to promoting electrification for the Board to consider and approve or reject. These action items presume NSPI would be the champion of electrification within the province while the SBA believes that is better suited to EOne, as referenced above.

The SBA does agree that addressing the impact on T&D planning as a result of electrification is a role for NSPI and should be addressed more proactively. This includes a major review of T&D planning practices to assure least cost T&D planning that is integrated with opportunities for DG and DSM as well as electrification.

3. Initiate a Thermal Plant Retirement, Redevelopment and Replacement Plan including:

3a. Develop a plan for the retirement and replacement of Trenton 5, targeting 2023, while identifying required replacement capacity and energy in parallel. Begin decommissioning studies for NS Power's other coal assets and develop and execute a coal retirement plan including associated regulatory approval process; this coal retirement plan will include significant engagement with affected employees and communities.

3b. Complete a thermal plant Depreciation Study to update depreciation rates and a recovery strategy to better align depreciation with updated useful lives for generation

assets. Invest sustaining capital into individual thermal units appropriate to their retirement categorization.

3c. Develop a plan for the redevelopment or replacement of existing natural gas-powered steam turbines to provide low-cost, fast-acting generating capacity to the Nova Scotia system. Fuel flexibility is a component of this work, including consideration for low/zero carbon alternative fuels.

3d. Initiate a wind procurement strategy, targeting 50-100 MW new installed capacity by 2025 and up to 350 MW by 2030. This strategy will solicit Nova Scotia-based market pricing information which will inform the selected wind capacity profile and timing, informed by the IRP wind sensitivities.

The SBA believes that these action items appear to presume Board approval for these actions and investments. The SBA would like NSPI to formally acknowledge that regulatory project approval applications will be required, including for some preliminary project planning.

4. Create a Demand Response Strategy targeting 75 MW of capacity, for deployment by 2025. Available resource cost, flexibility, and reliability may inform pursuit of additional Demand Response capability.

4a. The strategy will be closely linked to the Electrification Strategy being developed in parallel. The strategy will build on learnings from NS Power's Smart Grid Project, NS Power's Time Varying Pricing application, the DR Joint Working Group between NS Power and EfficiencyOne, the ELIADC tariff, and the Large Industrial Interruptible Rider.

The SBA would like to see NSPI expand the demand response perspective by fully integrating the modernization of its rates via rate redesign with the objectives, results, and prioritizations of the IRP. This would include the proposal of Time Varying Pricing but should also include a full cost of service and rate design review and presentation to the Board for review.

5. NS Power will calculate Avoided Costs of DSM (capacity and energy) for scenarios 2.0C and 2.1C. 2.0C will be used as the Reference Plan and 2.1C will be available for additional reference.

The SBA sees this action plan item as recognition that NSPI has yet to fully integrate DSM into its resource planning. Even though the delivery of the resource is the responsibility of another entity, in this case EOne, NSPI should consider DSM options more dynamically in the planning models, and not simply compare the program costs to the forecasted avoided cost. This simplistic approach may miss opportunities to identify additional programs or investments that would benefit customers. DSM is vital to the objectives of the IRP as it represents carbon reduction/avoidance; is a less capital-intensive resource; is a way to minimize T&D system upgrades; and a way to lower costs overall.

X. Specific Comments on Roadmap

The SBA interprets the Roadmap of the IRP as insufficient. The Roadmap has some excellent content but provides no direction. The Roadmap items are basically another action plan list. The roadmap should be more informative about strategy. The SBA would like to see a roadmap which monitors elements and discusses when a change in direction is warranted. The SBA recommends that improvement of this portion of the IRP become a priority item though the evergreen IRP process. The SBA would like to see it start with a discussion with stakeholders on what the roadmap should include in order to be most useful for the planning process.

Yours truly,


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